DESCRIPTION OF A CAST AND WROUGHT IRON TRUSSED-GIRDER BRIDGE ON THE LINE OF THE BISHOP AUCKLAND AND WEARDALE RAILWAY.

BY JOHN STOREY.

(*Read before the Institution of Civil Engineers, January* 9.)

The author states, that his attention has been long directed to the expensive construction of the brick and stone bridges, usually erected over and on the line of railways, and the apparent want of durability in the timber bridges, which have in some instances been substituted; as well as to the cast-iron bridges, which have generally been constructed in situations where the height between the top of the rails and the level of the roads which they span was so limited, as not to admit of a stone or a brick arch. In the latter cases, cast-iron girders have been employed, but their great weight has rendered them expensive, and has obliged the abutment piers for supporting them to be very substantial.

In order to obviate these objections, the author has introduced combinations of cast and wrought-iron in forms, which he contends may be advantageously adopted for occupation-bridges, or even for carrying the railway, and that they may be constructed at a less cost than stone, brick, or even timber bridges.

These bridges consist of longitudinal and segmental girders of cast-iron abutting against each other at the ends, secured together by bolts and nuts through the flanges, and resting on masonry-abutments: a system of wrought-iron tie-trussing is then applied, and struts are placed at certain distances where they are requisite. As many of these principal trusses are used as the strength of the bridge demands, and they are connected by transverse braces and distance pieces of cast-iron, thus preventing undue outward pressure; sockets are cast upon the girders to receive the timber-joists, and the platform is covered with Dantzic deal planking spiked to the joists. The wrought-iron struts at the top clasp the girders, to which they are also firmly bolted, and their lower extremities pass through the truss, so that on the nuts being screwed up, the truss is brought to its proper degree of tension, and being made sufficiently strong to bear the weight calculated for the bridge, independent of the segmental girders, the weight and strain are brought upon the abutments in the most favourable manner.

Bridges thus constructed do not require any centering for their erection, as each side may be put together near the spot, and by means of purchases, may be lifted entire on to the abutments, or the whole bridge may be put together before the earth is excavated from between the abutments, excepting only as much as is necessary for receiving the trussing.

The dimensions are given of occupation bridges, calculated to bear 8 tons, which is stated to be a greater weight than is required by the landowners. The total weight of cast and wrought iron in an oblique bridge of a span of 86 feet 3 inches and 11 feet wide, is 11 tons 7 cwt., and that of a square bridge of 106 feet 6 inches span and 11 feet wide, is 14¼ tons: their total cost, including excavating the ground, the masonry, stone pennings on the sides of the excavations beneath the bridge, the timber-work, and the painting, was, for the former 280*l.*, and for the latter 342*l.* These sums are stated to be much less than the expense of similar bridges of stone or even of timber.

A design is given of a stronger kind of bridge of similar construction for carrying two lines of railway. The span is 90 feet and the width 22 feet, between the side railings: the weight is 43 tons, and the total cost, including the masonry, is estimated not to exceed 1,200*l.* It is calculated to bear about 50 tons, which is as much as could be brought upon it by any passing train.

The author proposes to adapt this system of construction to bridges for crossing rivers, &c., in order that by the lightness of the piers, and their having to bear only a vertical thrust, the water-way may be less impeded than it is at present by the usual heavy stone structures.

A design is also submitted for a bridge, to consist of parallel cast-iron girders, trussed with wrought-iron bars, in such a manner as to convert the depth of the girder into a strut, the weight of the passing load being entirely resisted by the tensile strain of the bars.

The author does not claim the introduction of wrought-iron trussing for cast-iron girders, as he is well aware of its being constantly practised, but he believes that it has not been commonly done to the extent which he proposes; and being satisfied of the practical utility of the system, he was desirous of bringing it more prominently under the notice of engineers through the medium of the Institution, and also of inviting discussion upon the plan, one great merit of which is, that it uses a material produced in this country, better and cheaper than elsewhere, and assists one of its staple manufactures, which is at this moment much depressed.

The communication was accompanied by five drawings of bridges, fully illustrating in detail the various modes of construction treated of.

THE NEW METHOD OF CLOSING THE PNEUMATIC TUBE OF ATMOSPHERIC RAILWAYS.

BY M. HALLETTE.

(*Communicated to the French Academy.*)

In the system adopted by MM. Clegg and Samuda, this closing, as every one knows, is accomplished by means of a long band of leather, furnished with short iron tongues, which is free on one side and fixed by the other to the edge of the longitudinal opening that allows the passage of the rod by which the piston is united to the first waggon of the train. Being raised for a moment by a lever in the interior, so as to allow the passage of this rod, the band immediately falls again; a lever, the motion of which is connected with that of the piston, immediately afterwards presses it against the opening, and an unctuous substance further contributes towards rendering the adhesion more complete. But, independently of the unctuous body's appearing readily to undergo alteration by contact with the air, the leather band must gradually lose its suppleness, and tend, in places, to rise a little, after the passage of the compressing lever; it is therefore desirable that the closing of the longitudinal fissure, instead of being due to the action of a transient effort, should result from a constant action exercised in each point of the fissure. M. Hallette appears to have accomplished this, by availing himself of the elasticity of air.

For this purpose, he has arranged on the upper surface of the pneumatic tube, and bodily connected with it, two longitudinal semi-cylinders, or rather two gutters placed lengthwise, with their concave parts facing. Each of these gutters contains a gullet of elastic material, perfectly impervious both to air and to water. When the two gullets are sufficiently inflated with air, they touch each other by one part of their surface; they act as do the lips of the human mouth, and thus entirely intercept communication between the interior of the pneumatic tube and the exterior air. When the piston moves, the rod, which connects it with the train, slides between the two tubes, which unite again immediately after its passage. This rod, the horizontal section of which is a meniscus, and which hence penetrates, like a wedge, between the two gullets, acts upon them with scarcely any friction. However, in order to ensure their durability, M. Hallette has thought it advisable to protect them with leather at the parts by which they come in contact.

M. Hallette points out all the advantages for internal navigation, which may be derived from atmospheric propulsion, as perfected by himself. While developing M. Hallette's ideas, M. Arago remarked that a system of pneumatic tubes, fixed along the walls of the quay of the Seine, would cost much less in construction than a tow-path, and that the employment of steam for moving the boats would, in many respects, possess special advantages over the employment of horses.

This communication was illustrated by a small model.

CAMBRIDGE PHILOSOPHICAL SOCIETY.—At a meeting of this society, on Monday week, the Master of Trinity, President, in the chair, a paper was read by Professor De Morgan, on diverging series, and a paper by Professor Miller, on the restoration of the standard of weight.

MR. DAWSON, Royal Engineering department, has received the appointment of clerk to the works in Van Diemen's Land.

LIVERPOOL DOCK COMMITTEE PROCEEDINGS.

The usual weekly meeting of the Dock Committee was held at the Revenue-buildings, on Thursday, Mr. Alderman Bramley-Moore in the chair. The following members were present: Messrs. Nicol, Barclay, Holt, Holmes, Middleton, Smith, Molyneux, Trotman, Aikin, Tobin, Sandbach, Bold, Royden, Kendall, and Ripley.

A letter was read from Mr. William Brown, signed on behalf of several commercial gentlemen, in which the Dock Committee were called upon to complete the shed, covering over the whole space from Victoria to Waterloo Docks, with the view of rendering additional accommodation to the New York packet ships. Upon the motion of Mr. Nicol, it was resolved to increase the shed covering as it had been originally intended between the docks in question.

Messrs. Furnis and Hilton were declared the contractors for the completion of the shed at the King's Dock for the use of the Custom-house.

The sub-committee recommended the erection of a building for the tide-waiters at the north-western corner of the Prince's Dock, the situation of their present house, beyond the graving docks, being exceedingly inconvenient. The cost of the new building was estimated at 700*l.*; and the tide-waiters had intimated their willingness to pay a rent which would amply cover the original outlay for the construction. The sub-committee were authorized to carry out the plan.

The sub-committee reported that, after mature consideration, they could not recommend the board to accept of the proposal of the Steam Tug Company to tow out the life-boats for the sum of 1,000*l.* a year, and that they would prefer the procuring of a steam-boat for the dock trust. Some discussion ensued, at the close of which the subject was referred back, with liberty to the sub-committee to negotiate with the Steam Tug Company, and to bring the result before the general meeting.

Upon the motion of Mr. Bold, seconded by Mr. Ripley, it was ordered that a new bridge, the cost of which was estimated at 2,000*l.*, be erected at the north end of the George's Dock. Mr. Aikin wished it to be distinctly borne in mind that this bridge was about to be erected in order to afford accommodation to the public, and that its erection would not add any thing to the revenues of the dock trust. A document was then read, by which it appeared that the probable net income from the warehouses round the Albert Dock would amount to 38,000*l.*, and from the warehouses and dock 51,400*l.* This document was ordered to be inserted in the proceedings; and after the transaction of some financial business, the committee adjourned.

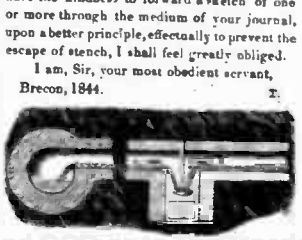
EFFLUVIA-TRAP FOR DRAINS.

TO THE EDITOR OF "THE BUILDER."

SIR,—I forward a section or diagram of an effluvia-trap for drains and sewers, which I acknowledge I have often seen executed. If any of your numerous correspondents would have the kindness to forward a sketch of one or more through the medium of your journal, upon a better principle, effectually to prevent the escape of stench, I shall feel greatly obliged.

I am, Sir, your most obedient servant,

Brecon, 1844. Z.



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